



# CALTRANS REGIONAL OPERATIONS FORUMS

Work Zone Management and Safety





# What Are Some Challenges You Experience With Work Zones?

- How do work zones affect operation of the transportation system?







# Work Zone Challenges

- ▶ Worker & road user safety
- ▶ Work zone congestion & delay
  - ↳ Major source of delay for rural areas
- ▶ Roadway capacity & speed reductions
- ▶ Alternate routing & travel route availability
- ▶ Lack of coordination
- ▶ Day & night time condition awareness/visibility
- ▶ Traffic pattern changes
- ▶ Traffic incident management





# Traveler Perceptions

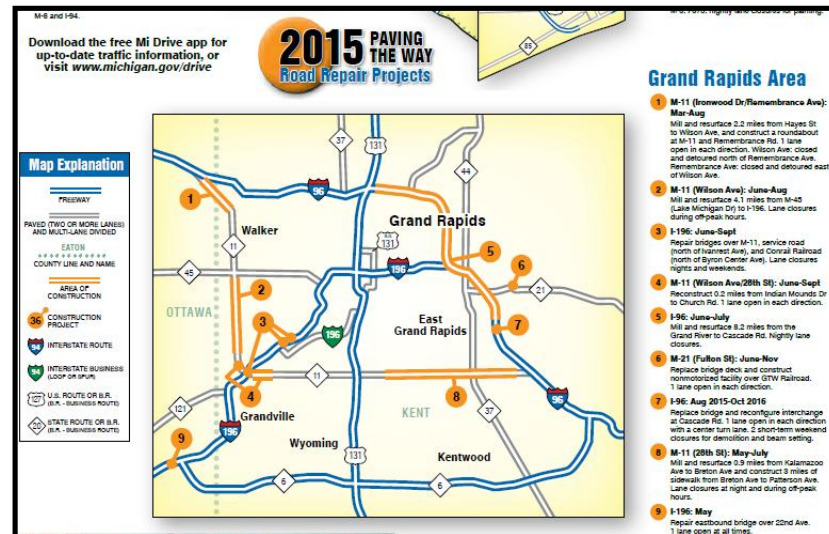
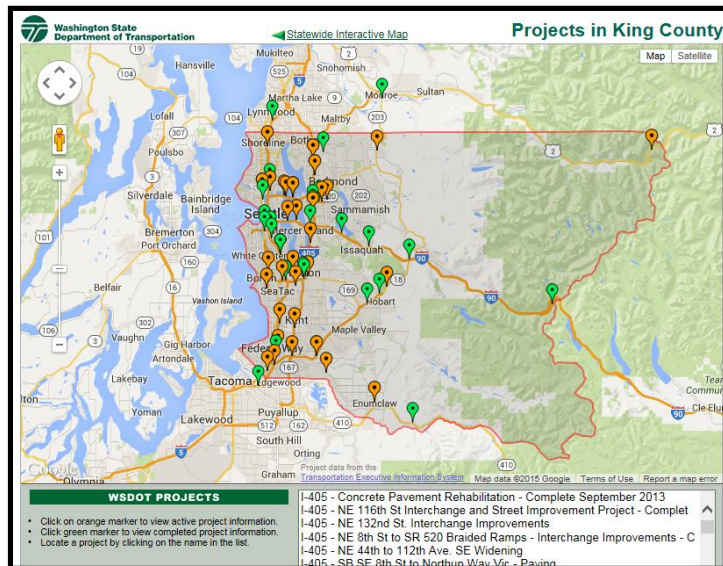




# How Travelers Experience Work Zones

DELAY

OUT THERE  
“FOREVER”



CONFUSING  
THEY'RE  
EVERYWHERE  
CONGESTION



/ Kimley»Horn





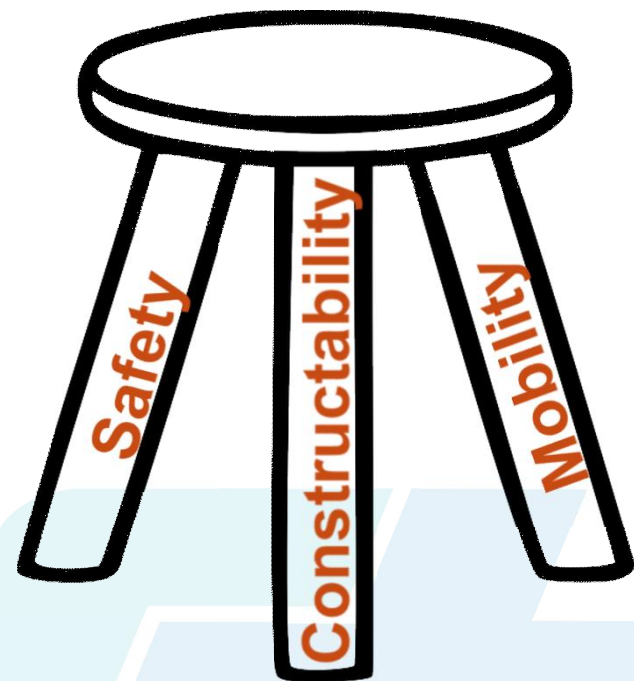
# Work Zone Management

► Need to balance:

- ↳ Safety
- ↳ Mobility
- ↳ Constructability

## Objective:

Achieve constructability without compromising safety and mobility





# Project and Its Impacts

- ▶ Type of Work
- ▶ Duration
- ▶ Facility Type
  - ↳ Bridge, Arterial, Highway, etc.
- ▶ Level of Expected Impacts
  - ↳ Traffic, Access, Other



***What are other considerations?***



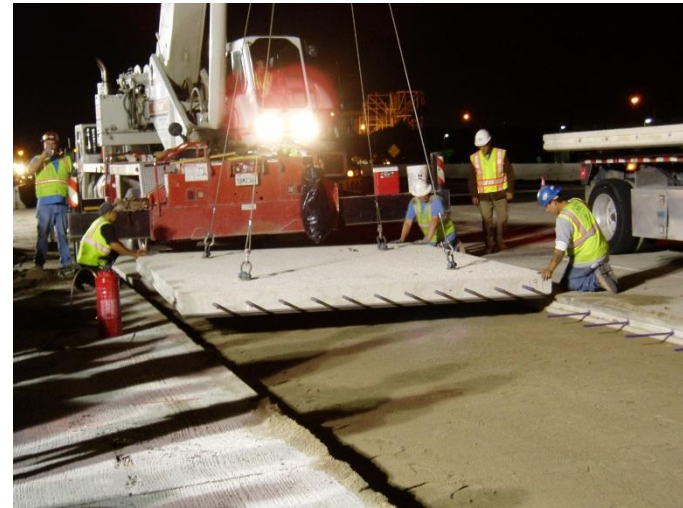
# Other Considerations

## ► Stakeholder Needs

- ↳ Special events
- ↳ Seasonal traffic

## ► Constraints

- ↳ Budget
- ↳ Alternate routes
- ↳ Other work zones
- ↳ Political sensitivities



What else?




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


- ▶ Identify impacts
  - ↳ Consider various stakeholders
- ▶ Tools
  - ↳ Lane closure spreadsheets
  - ↳ Templates/checklists
  - ↳ Modeling
- ▶ Determine level of impacts
  - ↳ Acceptable?
- ▶ Mitigate impacts accordingly



**TDOT**

## Work Zone Safety Determination



**Work Zone Safety & Mobility Procedures**

State PE Number: \_\_\_\_\_ Route/From-To: \_\_\_\_\_

Pin: \_\_\_\_\_ County: \_\_\_\_\_

Analyst: \_\_\_\_\_ Project/Construction AADT: \_\_\_\_\_

This is an ☐ Initial ☐ Secondary ☐ determination of the project's significance.

**Major Route Criteria**

A project lasting at least three days on an interstate route within a TMA with intermittent or continuous lane closures ☐

A project where all lanes in one direction will be closed on (a) any interstate route or (b) a non-interstate route having an AADT of at least 50,000 vpd ☐

Yes, by the Major Route Criteria, this is a Significant Project.
☐

No, the Major Route Criteria are not met.
☐

**Delay Criteria**

Urban ☐ Rural ☐ Freeway ☐ Arterial ☐ Collector/Other ☐

No. of lanes (in one direction) \_\_\_\_\_ Max. Allowable AADT (24-hr, two-way) from Table 3.1: \_\_\_\_\_

to be open in work zone: \_\_\_\_\_

Yes, by the Delay Criteria, this is a Significant Project (project AADT > max AADT).
☐

No, the Delay Criteria are not met (project AADT < max AADT).
☐

**Qualitative Criteria**

Rate the following aspects of the work zone:

	High	Low
Business impacts (how many businesses affected?)	<input type="checkbox"/>	<input type="checkbox"/>
Public interest	<input type="checkbox"/>	<input type="checkbox"/>
Exposure impacts due to long project duration	<input type="checkbox"/>	<input type="checkbox"/>
Impacts due to alternate routes	<input type="checkbox"/>	<input type="checkbox"/>

[illegible]



# What is a TMP?

- ▶ Transportation/Traffic Management Plan (TMP)
- ▶ Design documents show how a project will be built
  - ↳ TMP shows how traffic will be managed during construction
- ▶ Required on ALL Federal-aid projects
- ▶ Scalable to the project
- ▶ Considered a living document
  - ↳ Start early and update as needed
  - ↳ Monitor during construction and adjust if needed





# Components of a TMP

- ▶ Three main components
  - ↳ Temporary Traffic Control Plan (TTCP)
  - ↳ Transportation Operations (TO) strategies
  - ↳ Public Information and Outreach (PI) strategies
- ▶ Significant Projects = All 3 components required
- ▶ Other projects = TTCP required
  - ↳ TO and PI considered as appropriate



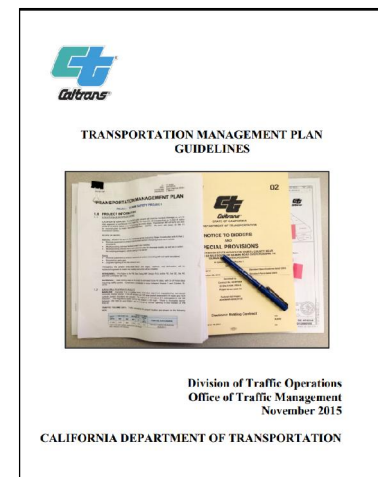




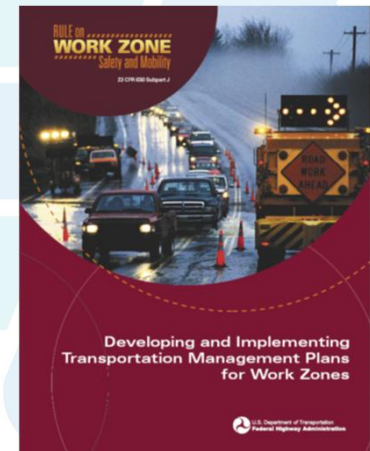
# What's Your Process for TMP Development?

- ▶ Who's involved?
- ▶ When does it start?
- ▶ Does it work well?

## Caltrans TMP Guidelines



## FHWA TMP Guide: *Developing and Implementing TMPs for Work Zones*





# TMP Development in Caltrans

- ▶ Begins during project initiation and planning
- ▶ Responsibility of 3 individuals
  - ↳ District traffic manager (DTM)
  - ↳ TMP manager
  - ↳ Construction traffic manager
- ▶ 3 levels - factors
  - ↳ Project characteristics
  - ↳ Projected delay

LEVEL OF TMP	TYPES OF CONDITIONS	TYPES OF STRATEGIES
"Blanket" TMP	<ul style="list-style-type: none"> <li>No expected delays</li> <li>Off-peak work</li> <li>Low volume roads</li> <li>Moving lane closures</li> </ul>	<ul style="list-style-type: none"> <li>Portable changeable message sign (CMS)</li> <li>Freeway service patrol (FSP)</li> <li>Traffic management team (TMT)</li> <li>Only working in off-peak hours</li> </ul>
"Minor" TMP (Majority of TMPs fall into this category)	<ul style="list-style-type: none"> <li>Minimal impacts expected</li> <li>Lane closure required for project</li> <li>Some mitigation measures required for project</li> </ul>	<ul style="list-style-type: none"> <li>Only working at night</li> <li>Portable and fixed CMS</li> <li>Construction Zone Enhanced Enforcement Program (COZEEP) or MAZEPP for maintenance activities</li> <li>TMT</li> <li>Highway advisory radio</li> </ul>
"Major" TMP (~5% of TMPs are major)	<ul style="list-style-type: none"> <li>Significant impacts expected</li> <li>Multi-jurisdictional in scope</li> <li>Longer duration</li> <li>Multiple contracts involved</li> </ul>	Same as for Minor TMPs plus: <ul style="list-style-type: none"> <li>Public awareness campaigns</li> <li>Extended closures to expedite work</li> <li>Moveable barriers to reverse lanes during peak periods</li> <li>Detours</li> <li>Reduced lane widths</li> <li>Website</li> </ul>



# WZ Management Strategies

- ▶ Contract incentives
- ▶ Accelerated construction
- ▶ Off-peak/night work
- ▶ Narrowed lanes
- ▶ Ramp and road closures
- ▶ Contraflow lanes
- ▶ Traffic control
- ▶ Enhanced enforcement
- ▶ Freeway service patrol
- ▶ Demand management
- ▶ Traveler information
- ▶ ITS
- ▶ Signal timing adjustments
- ▶ ...and many more

**Which of these strategies  
affect TSMO?**







# Design and Contracting

- ▶ Design decisions and WZ operations
- ▶ Contracting decisions and WZ operations
- ▶ ***Do you interact with Design and Contracting?***
- ▶ ***Is WZ traffic management considered?***





# Construction Approaches - examples

- ▶ Basic approach to building the job
  - ↳ Part-width construction
    - ↳ Short term lane closures
    - ↳ Long-term lane closures
    - ↳ Night work vs peak vs off-peak
  - ↳ Close 1 side, crossover, run opposing traffic on 1 side
  - ↳ Full closure
- ▶ How does the choice of construction approach affect TSMO?





# I-84/Portland: Crews work without interruption



/ Kimley»Horn



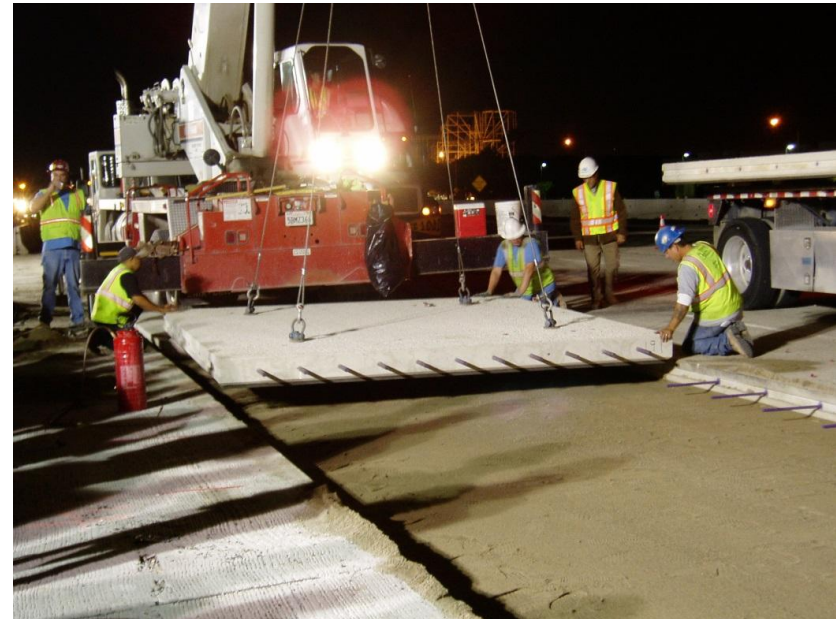




# Accelerating Projects - examples

## ► *Getting the work done sooner reduces impacts*

- ↳ Construction using pre-fab components
- ↳ Contracts that include incentives to finish earlier
- ↳ Design-Build





# Work Zone ITS - applications

- ▶ Traffic management systems
  - ↳ Traditional traffic management
    - ↳ Monitoring
    - ↳ Signals
    - ↳ Ramp metering
  - ↳ Dynamic merge systems
  - ↳ Variable speed limit/Active traffic management (ATM) systems
  - ↳ Queue warning systems
- ▶ Traveler information systems
- ▶ Incident management systems
- ▶ Intrusion alarm systems
- ▶ Automated speed enforcement/feedback systems





# Dynamic Merge Systems

- ▶ Dynamic signs and devices control vehicle merging approaching lane closures
- ▶ Changes lane use instructions based on current traffic conditions
- ▶ Sensors determine congestion level or queue length
- ▶ “Early” and “Late”





# Dynamic Late Merge

1.5 miles  
from Taper



At Taper







# Variable Speed Limit (VSL)

- ▶ Provides ability to set speed limit based on work zone conditions
  - ↳ Type of work being done
  - ↳ Characteristics of work zone
  - ↳ Weather
- ▶ Improved driver compliance with posted speeds on VSL





# Queue Warning Systems

## ► Goals

- ↳ Reduce risk of crashes
- ↳ Inform public about delays and help with options to minimize delays



## ► Functions

- ↳ Detect speeds
- ↳ Warn drivers of slowed/stopped traffic ahead
- ↳ Provide anticipated delay at decision points before WZ

## ► Equipment

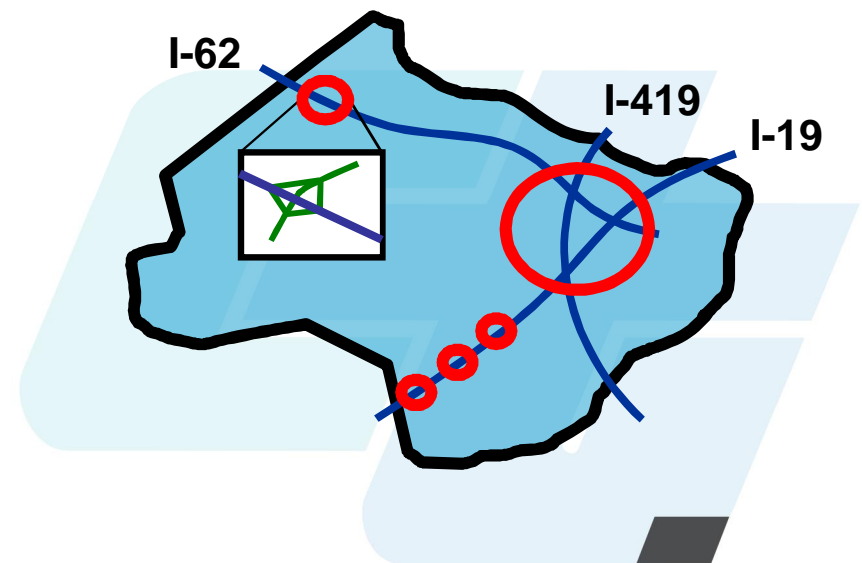
- ↳ Sensors
- ↳ Portable message boards





# Corridor Construction Impacts – Group Discussion

- ▶ What challenges do you face on coordinating nearby construction projects?
- ▶ How have you responded to these challenges?
  - ↳ What has worked well?
  - ↳ What hasn't worked so well?





# Work Zone Resources



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# Key Work Zone Resources

- ▶ Work Zone Safety and Mobility Final Rule  
[http://www.ops.fhwa.dot.gov/wz/resources/final\\_rule/language.htm](http://www.ops.fhwa.dot.gov/wz/resources/final_rule/language.htm)
- ▶ Developing and Implementing Transportation Management Plans for Work Zones  
[http://www.ops.fhwa.dot.gov/wz/resources/publications/trans\\_mgmt\\_plans/trans\\_mgmt\\_plans.pdf](http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf)
  - ↳ TMP training online course  
[http://www.ops.fhwa.dot.gov/wz/resources/final\\_rule/tmp\\_examples/tmp\\_dev\\_resources.htm](http://www.ops.fhwa.dot.gov/wz/resources/final_rule/tmp_examples/tmp_dev_resources.htm)
- ▶ FHWA Work Zone Website <http://www.ops.fhwa.dot.gov/wz/index.asp>
- ▶ National Work Zone Safety Information Clearinghouse:  
<http://www.workzonesafety.org>
- ▶ Work Zone Best Practices Guidebook  
<http://www.ops.fhwa.dot.gov/wz/practices/best/bestpractices.htm>



# Additional Work Zone Resources

- ▶ FHWA Work Zone ITS Implementation Guide  
<http://www.ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf>
- ▶ AASHTO ITS in Work Zones  
<http://stsmo.transportation.org/Pages/its.aspx>
- ▶ ITS Safety and Mobility Solutions: Improving Travel Through America's Work Zones  
[http://www.atssa.com/galleries/default-file/2008July21\\_ITS\\_Safety\\_and\\_Mobility.pdf](http://www.atssa.com/galleries/default-file/2008July21_ITS_Safety_and_Mobility.pdf)
- ▶ Caltrans Work Zone Traffic Control Resources  
<http://www.dot.ca.gov/trafficops/tcd/workzones.html>
- NCHRP Synthesis 379: Selection and Evaluation of Alternative Contracting Methods to Accelerate Project Completion  
[http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_syn\\_379.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_379.pdf)



# EDC3: Smarter Work Zones

*Innovative strategies designed to optimize work zone safety and mobility*

## ► Project Coordination

*Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions to minimize work zone traffic impacts.*

## ► Technology Application

*Deployment of Intelligent Transportation Systems (ITS) for dynamic management of work zone traffic impacts, such as queue and speed management.*

<http://www.workzonesafety.org/SWZ> - webinars, case studies, and more

